

*F1
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a photosensitive area within said substrate for accumulating photo-generated charge in said area;

*G1
concl.*
a photogate for controlling the accumulation of photo-generated charge in said photosensitive area; and

a nitrogen containing insulating layer in contact with said substrate and beneath said photogate.

*Sub
I1*
14. (Amended) An imaging device including a semiconductor integrated circuit substrate, said imaging device comprising:

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a photosensitive device, including a photogate overlying said substrate, for accumulating photo-generated charge in a photosensitive area of said substrate;

a readout circuit comprising at least an output transistor formed in said substrate;

a reset transistor for periodically resetting said node to a predetermined voltage; and

a nitrogen containing insulating material in contact with said substrate and beneath said photogate.

*I3
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I1*
28. (Twice amended) An imaging system comprising:

a plurality of active pixel sensors arranged in an array of rows and columns, each active pixel sensor being operable to generate a voltage at a diffusion node corresponding to detected light intensity by the sensor;

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cont

a photogate formed over a charge collection area in a substrate in said pixel sensor, wherein a nitrogen containing insulating layer is in contact with said substrate and beneath said photogate;

a reset device to periodically reset the voltage of said diffusion node;

a row decoder having a plurality of control lines connected to the sensor array, each control line being connected to activate the sensors in a respective row; and

a plurality of output circuits, each output circuit being connected to the respective sensors in a column, operable to store voltage signals received from the sensors and to provide a sensor output signal.

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I.
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34. (Amended) The imaging system according to claim 28, wherein said nitrogen containing insulating layer is a nitrogen oxide containing layer.

35. (Amended) The imaging system according to claim 34, wherein said nitrogen containing insulating layer is an ONO layer.

36. (Amended) The imaging system according to claim 34, wherein said nitrogen containing insulating layer is an NO layer.

37. (Amended) The imaging system according to claim 34, wherein said nitrogen containing insulating layer is an ON layer.

38. (Amended) The imaging system according to claim 33, wherein said silicon nitride insulating layer is a chemical vapor deposition deposited layer.

39. (Twice amended) An imaging system comprising:

a plurality of active pixel sensors arranged in an array of rows and columns, each active pixel sensor being operable to generate a voltage at a floating diffusion node corresponding to detected light intensity by the sensor;

F4 cont
a photogate formed over a charge collection area in a substrate in said pixel sensor, wherein a nitrogen containing insulating layer is in contact with said substrate and beneath said photogate;

a reset device to periodically reset the voltage of said diffusion node;

a row decoder having a plurality of control lines connected to the sensor array, each control line being connected to activate the sensors in a respective row; and

a plurality of output circuits, each output circuit being connected to the respective sensors in a column, operable to store voltage signals received from the sensors and to provide a sensor output signal.

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47. (Amended) The imaging system according to claim 39, wherein said nitrogen containing insulating layer is a nitrogen oxide containing layer.

48. (Amended) The imaging system according to claim 47, wherein said nitrogen containing insulating layer is an ONO layer.

49. (Amended) The imaging system according to claim 47, wherein said nitrogen containing insulating layer is an NO layer.

50. (Amended) The imaging system according to claim 47, wherein said nitrogen containing insulating layer is an ON layer.

51. (Amended) The imaging system according to claim 46, wherein said silicon nitride insulating layer is a chemical vapor deposition deposited layer.

52. (Amended) The imaging system according to claim 48, wherein said ONO insulating layer is a chemical vapor deposition deposited layer.

53. (Amended) A system comprising:

(i) a processor for processing image data; and

(ii) a CMOS imaging device for providing image data to said processor and including:

a substrate;

a photosensitive area within said substrate for accumulating photo-generated charge in said area;

a photogate for controlling the accumulation of photo-generated charge in said photosensitive area; and

a nitrogen containing insulating layer in contact with said substrate and beneath said photogate.

117. (Amended) The imaging system according to claim 28, wherein said nitrogen containing layer has been removed wherever it is not covered by said photogate.

118. (Amended) The imaging system according to claim 39, wherein said nitrogen containing layer has been removed wherever it is not covered by said photogate.

Sub I
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122. (Three times amended) The imaging system according to claim 28,

further comprising a gate stack over said substrate, wherein said gate stack is disposed over an insulating layer of silicon dioxide disposed over said substrate.

123. (Three times amended) The imaging system according to claim 39,

further comprising a gate stack over said substrate, wherein said gate stack is disposed over an insulating layer of silicon dioxide disposed over said substrate.

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127. (Amended) The imaging system according to claim 117, further

comprising a gate stack over said substrate and beneath said insulating layer, wherein said gate stack is disposed over an insulating layer of silicon dioxide disposed over said substrate.

128. (Amended) The imaging system according to claim 118, further

comprising a gate stack over said substrate and beneath said insulating layer, wherein said gate stack is disposed over an insulating layer of silicon dioxide disposed over said substrate.

Sub I
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132. (Amended) The imaging system according to claim 122 wherein each said

photogate and said nitrogen containing insulating layer are only partially disposed over said gate stack.

133. (Amended) The imaging system according to claim 123 wherein each said

photogate and said nitrogen containing insulating layer are only partially disposed over said gate stack.

Sub IV
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137. (Twice amended) The imaging system according to claim 122, wherein

said gate stack comprises a transfer gate stack and a reset gate stack.